Immunization for Life: Childhood

The National Immunization Program works with healthcare providers, public and private sector partners, and state and local government agencies to ensure that childhood immunizations remain at high levels. NIP also works with these partners to foster awareness of immunization recommendations and to increase knowledge about vaccines.

Childhood Immunization Schedule

One of NIP's most important activities is the development and distribution of the childhood immunization schedule, a publication that summarizes recommendations for childhood vaccines in table format. Three advisory bodies collaborate to issue a single schedule of routine childhood immunizations: the Advisory Committee on Immunization Practices (ACIP), the American Academy of Pediatrics (AAP), and the American Academy of Family Physicians (AAFP). The schedule is continually evaluated to ensure the highest level of effectiveness, efficiency, and safety in childhood immunizations. See the 2005 **Recommended Childhood Immunization Schedule** on the following page.

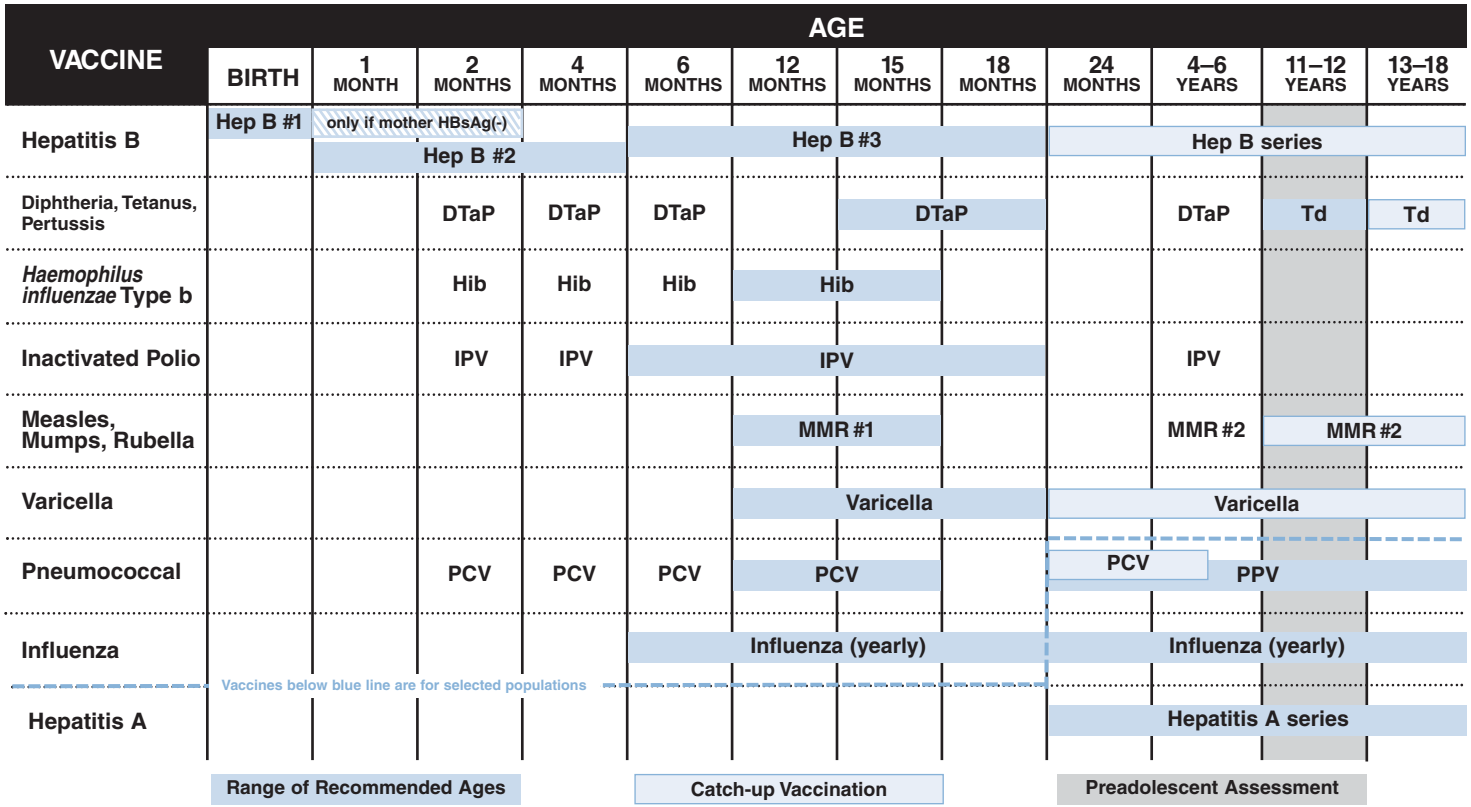
Vaccines for Children Program

Congress established the Vaccines for Children Program (VFC) in 1994 to better ensure equal access to immunizations for all children. The VFC program is a state-operated federal entitlement program that removes vaccine cost as a barrier to immunization for our neediest children. More than $950 million was spent by the VFC program in fiscal year 2004 to purchase vaccines for eligible children.

Over 43,532 provider sites are enrolled in the VFC program, and 32,350 of these are private provider sites. The VFC program provides public-purchased vaccine to all enrolled providers who agree to vaccinate VFC-eligible children from birth through 18 years of age. These children must be Medicaid-eligible, without health insurance, American Indian, or Alaska Native. In addition, children who have health insurance that does not cover vaccines are eligible for the VFC program if they are served through a federally qualified healthcare center or rural health clinic.

(top) December 2003 Polio National Immunization Day campaign, Ramadan Suburb, Sharkia Governorate, Egypt.
(bottom) Regional Disease Control Officer's children, Volta region, Ghana.

Recommended Childhood and Adolescent Immunization Schedule
United States • 2005



This schedule indicates the recommended ages for routine administration of currently licensed childhood vaccines, as of December 1, 2004, for children through age 18 years. Any dose not administered at the recommended ages should be administered at any subsequent visit when indicated and feasible. View the schedule online at www.cdc.gov/nip/recs/child-schedule.htm.

Indicates age groups that warrant special effort to administer those vaccines not previously administered. Additional vaccines may be licensed and recommended during the year. Licensed combination vaccines may be used whenever any components of the combination are indicated and other components of the vaccine are not contraindicated.

Providers should consult the manufacturers' package inserts for detailed recommendations. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS). To obtain and complete a VAERS form, visit www.vaers.org or call 1-800-822-7967.

Approved by the Advisory Committee on Immunization Practices—www.cdc.gov/nip/acip, the American Academy of Pediatrics—www.aap.org, and the American Academy of Family Physicians—www.aafp.org.

Childhood Immunization Registries

State, Community, and Healthcare Provider Immunization Information Systems

Immunization information systems (IIS) or immunization registries are confidential, computerized information systems that record, store, and provide fast access to children's immunization records. Electronic records and computer information systems are important tools to increase and sustain high vaccination coverage, especially among children. Computerized records improve healthcare providers' abilities to update records and to share them with other healthcare providers in a practice, community, or state. Data from the 2003 Immunization Registry Annual Report (IRAR) from the 50 states and Washington, D.C., indicate that in 2003, 44% of children younger than 6 years of age were participating in an immunization registry.

Recent Immunization Information System Achievements

The Healthy People 2010 immunization information system objective is to increase to 95% the proportion of children participating in fully operational, population-based registries. Eight reporting areas (Arkansas, Arizona, Delaware, Michigan, New York City, Oregon, North Dakota, and Washington, D.C.) have met or exceeded the 95% participation objective as of the end of 2003.

In the 50 states and 6 cities that operate immunization information systems or registries regionally or statewide, an average of 76% of public immunization provider sites and 36% of private provider sites submitted data to a registry during the last 6 months of 2003. Arkansas, Connecticut, Mississippi, South Dakota, and Washington, D.C. reported over 95% of their private immunization provider sites submitted data to a registry during the last 6 months of 2003.

In 2004 Every Child by Two (ECBT) and the American Immunization Registry Association (AIRA) published ***Partnering with Health Plans: A Practical Guide***. This resource provides immunization information system and program staff with a better understanding of health plan operations and with instructions for marketing immunization information systems. AIRA continues to promote exchange of data between managed care organizations (MCOs) and immunization registries by building the capacity of registries, while ECBT works with individual managed care organizations and with the American Academy of Pediatrics, America's Health Insurance Plans, and the National Committee for Quality Assurance.

To assist grantees in developing a standardized approach to linking their immunization information systems with the Vaccine Adverse Event Reporting System (VAERS), AIRA formed the Vaccine Safety and Registry Community Work Group. Collaborating with CDC, this workgroup used a consensus-based approach to analyze reporting scenarios, functional capacities, and VAERS reporting requirements. The VAERS reporting system is improving its ability to electronically receive data, including the ability to receive standard electronic messages and web-based reports. For more information about VAERS, see the *Leadership in Vaccine Safety* section of this report.

CDC continues to move towards IIS certification. Certification criteria for the final functional standard, protecting the confidentiality of healthcare information, have been developed and pilot tested.

CDC continues to fund immunization registry sentinel sites. CDC has funded IIS sentinel sites to develop and implement initiatives for data quality improvement. Sites also provide quarterly estimates of immunization coverage and have helped CDC monitor the impact of vaccine shortages on vaccination coverage, most notably during the 2003–04 flu vaccination season. In 2004 NIP invited eligible registries to identify a population of children in a geographic area with complete vaccination histories to apply for Sentinel Site funding, soliciting two types of applications: "capacity building," aimed at improving IIS data quality and providing support for routine analysis of IIS data, and "implementation," aimed at performing population-based evaluations that can accurately assess trends in vaccination coverage for all children 18 years of age or younger.

Benefits of Immunization Information Systems

For **parents**, immunization registries provide many benefits. Immunization registries can

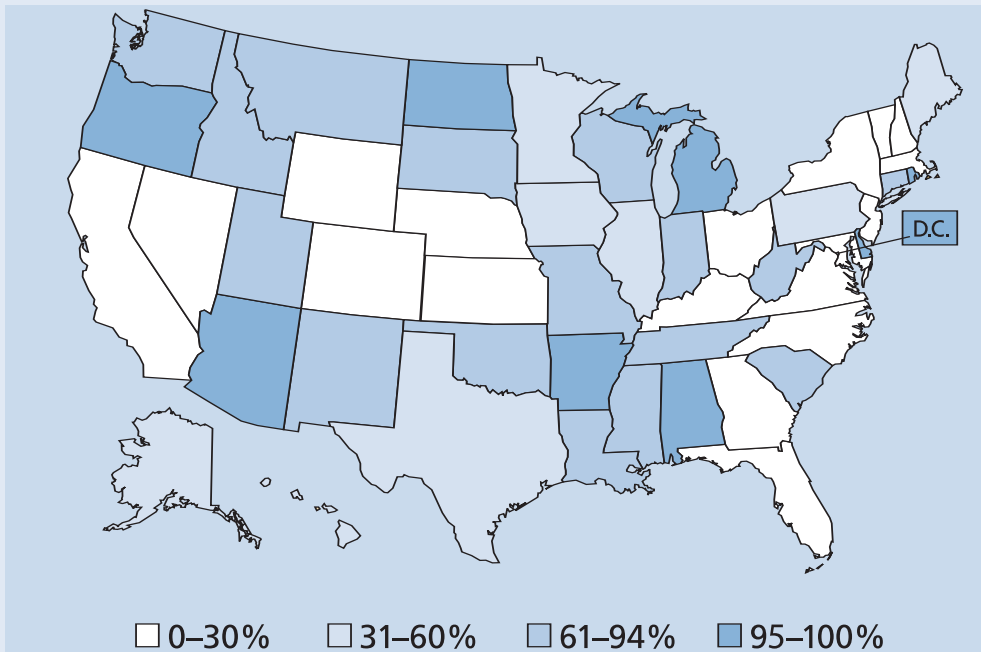
- Consolidate immunization histories for individual children
- Provide an accurate, official copy of a child's immunization history for personal, day care, school, or camp entry requirements
- Help ensure that a child's immunizations are up to date
- Provide reminders when vaccination is due
- Provide recall notices when vaccination has been missed
- Help ensure timely immunization for children whose families move or switch healthcare providers
- Prevent unnecessary (redundant) immunization

For **healthcare providers**, immunization registries offer many advantages. Registries can

- Consolidate immunizations from all providers
- Provide a reliable immunization history for any child, whether a new or continuing patient
- Provide definitive information on immunizations due or overdue
- Provide current recommendations and information on new vaccines
- Produce reminder and recall notices for patients

Continuing Efforts for Immunization Information Systems

To reach the Healthy People 2010 objective of 95% of children participating in population-based registries, registry activities support increasing the proportion of children and private healthcare providers who participate in registries; ensuring the security of registry data; identifying resources and funding for immunization registries; improving registry data quality; helping registries become "certification ready"; exploring the use of registries for adult immunization; promoting consistency in registries; exploring the role of registries in electronic medical records; and promoting the use of registry data for immunization program planning and development.



As this map indicates, participation in immunization information systems (registries) is increasing. In 6 states and 2 cities, the Healthy People 2010 objective was met in December 2003, and in 3 states and 1 city, participation in immunization information systems is at the 90%–94% level, very close to the Healthy People 2010 objective of 95% participation.

Improving Immunization Awareness

Campaigns to Raise Awareness of Immunization

National Childhood Immunization Campaign Continues

The National Immunization Program continues to promote awareness of the childhood immunization recommendations. In 2004, for the ninth consecutive year, NIP conducted a nationwide public service and education campaign to educate parents about the importance of childhood immunization. The bilingual campaign, which also promotes toll-free Spanish-language and English Immunization Information Hotline numbers, included a 30-second television public service announcement (PSA) in English and Spanish, English and Spanish radio live-read scripts, a Spanish video news release, and English and Spanish print ads, posters, and media kits. Serving as spokesperson for the Spanish-language campaign, Acting Assistant Secretary for Health and Human Services Rear Admiral Cristina V. Beato promoted national childhood immunization through a radio media tour and a television appearance on the nation's top-rated Spanish-language television morning talk show, *Despierta America*. The campaign received more than 94 million media impressions from television, radio, and print. Television coverage included 14 of the top 25 Hispanic markets and 20 of the top 50 markets for general audiences. More than 123 million unique user hits were garnered from campaign materials placed on partner websites and web magazines.

NIP Sponsors National Infant Immunization Week (NIIW)

This past year also marked the tenth anniversary of National Infant Immunization Week (NIIW). Celebrated in April, this annual event focuses on the importance of immunizing infants against 12 vaccine-preventable diseases by age 2. Participants in NIIW include members of state and local health departments, healthcare providers, and other immunization partners. NIIW 2004 was held April 24–30, coinciding with Vaccination Week in the Americas and with Canada's National Immunization Awareness Week.

For the 2004 event, NIP developed the National Infant Immunization website, www.cdc.gov/nip/events/niiw. Local organizations can download items from the website as needed. Public relations materials, national childhood campaign materials, web banners and buttons, and logos are available from the site. NIP distributed over 25,000 English and Spanish-language posters to programs, partner agencies, and other organizations; at least 250 groups placed orders for materials through the NIIW website, which received over 18,394 hits over a period of about 10 weeks.

10th Anniversary
NIIW
National Infant Immunization Week
April 25 - May 1, 2004

NIIW activities across the U.S. in 2004.

NIIW 2004, A Special Campaign

For NIIW 2004, the U.S. Department of Health and Human Services (HHS) and the Centers for Disease Control and Prevention (CDC) participated in an unprecedented multi-national Western Hemisphere campaign to promote immunization in all countries of the Americas. During April 24–May 1, 2004, HHS and CDC worked with the Pan American Health Organization (PAHO), the United States-Mexico Border Health Commission (USMBHC), and more than 35 nations for Vaccination Week in the Americas (VWA), highlighting the need for routine vaccinations and promoting access to health services in all countries. Both Canada and the United States supported VWA with public awareness campaigns about the importance of immunization. Local organizations and communities across the country participated in NIIW-VWA, combining PAHO and CDC themes in support of the continental childhood vaccination campaign: "Vaccination: An Act of Love: Love Them, Protect Them, Immunize Them."

NIIW-VWA Campaign Highlights for 2004

In the U.S., NIP staff traveled to 12 cities in 8 states, including New York City, Miami, Florida, and Indianapolis, Indiana, to participate in media events, grand rounds, provider education and training conferences, community forums, awards ceremonies, and other events promoting National Infant Immunization Week and Vaccination Week in the Americas. U.S. ambassadors for vaccination included Every Child By Two co-founders former First Lady Rosalyn Carter and Betty Bumpers, New Mexico's First Lady Barbara Richardson, and Admiral Cristina Beato. Rosalyn Carter's interview with CNN's Accent Health was aired during NIIW, reaching an audience of 5 million.

Special events were also held in sister city sites throughout the U.S.-Mexico border region, including San Diego, California-Tijuana, Mexico and El Paso, Texas-Ciudad Juarez, Mexico; for the first time, 2 countries and 10 states collaborated on the campaign. A kick-off event held in El Paso, Texas, brought together Admiral Cristina Beato, Regional Public Health Director of the Texas Department of Health Dr. Miguel Escobedo, former Cabinet Secretary of the New Mexico Department of Health and member of the U.S.-Mexico Border Health Commission Patricia Montoya, and Acting Director of CDC's National Immunization Program Dr. Stephen Cochi to support and promote immunization. The U.S. events generated plenty of publicity, providing opportunities to spread the message of the importance of childhood vaccination.

During Vaccination Week in the Americas over 40 million children and adults throughout 35 countries in the Western Hemisphere were vaccinated. This initiative worked to protect those with little access to healthcare against such diseases as polio and measles. Haiti, the poorest country of North America, set a special example by vaccinating 150,000 children. Thousands of volunteers traveled throughout the Americas to offer first-time vaccination and help complete vaccination series for full protection against disease.

NIP staff also assisted with VWA efforts throughout the Western Hemisphere. Three medical epidemiologists and a public health advisor served as technical consultants in Guyana, Bolivia, Argentina, and Paraguay, assisting with campaign monitoring and evaluation.

NIP Acting Director Dr. Stephen Cochi, Anna Eleanor Roosevelt, and NIP OHC Acting Assistant Deputy Director Curtis Allen. Anna Roosevelt's grandfather, President Franklin D. Roosevelt, founded the March of Dimes in 1921.

Dr. Stephen Cochi and Admiral Cristina Beato participating in National Infant Immunization Week 2004.

The National Immunization Survey

The **National Immunization Survey (NIS)** is the nation's primary tool for assessing immunization coverage among preschool-aged children in the U.S. This random-digit-dial telephone survey is conducted annually by CDC to obtain national, state, and selected urban-area estimates of vaccination coverage rates for U.S. children aged 19–35 months. Vaccination information obtained from the telephone survey is then validated by surveys that are mailed to the children's vaccination providers.

NIS data revealed that, in 2003, coverage with 3 or more doses of any diphtheria and tetanus toxoids and pertussis vaccine (DTP/DTaP/DT) was 96%; coverage with 3 or more doses of any poliovirus vaccine was 91.6%; coverage with 1 or more doses of measles-mumps-rubella vaccine (MMR) was 93%; coverage with 3 or more doses of Hib vaccine was 93.9%; and coverage with 3 or more doses of hepatitis B vaccine was 92.4%. Furthermore, coverage with one or more doses of varicella vaccine at or after the child's first birthday (unadjusted for history of varicella illness) increased from 67.8% in 2000 to 84.8% in 2003. Overall, coverage for the vaccines routinely recommended for childhood immunizations was at or near record levels, which accounts for the record or near record-low number of cases of vaccine-preventable disease in the U.S. Estimates of vaccination coverage for children aged 19–35 months based on NIS data can be found on the NIP website at **www.cdc.gov/nip/coverage**; estimates are reported there for years 1995–2003 and can be viewed by state, by certain urban reporting areas, and by demographic characteristics.

Overall, coverage for the vaccines routinely recommended for childhood immunizations was at or near record levels, which accounts for the record or near record-low number of cases of vaccine-preventable disease.

For the first time, the 2003 NIS measured hepatitis A vaccination coverage among 24–35 month-old children. The Advisory Committee on Immunization Practices (ACIP) recommends hepatitis A vaccination for children 2 years old or older residing in 11 states (Alaska, Arizona, California, Idaho, Nevada, New Mexico, Oklahoma, Oregon, South Dakota, Utah, and Washington). ACIP also recommends considering routine vaccination for children living in six states (Arkansas, Colorado, Missouri, Montana, Texas, and Wyoming). The recommendations were based on elevated incidence of hepatitis A disease in these states. The 2003 NIS found hepatitis A coverage (one or more doses) was 51% in the 11 states where routine vaccination is recommended, 25% in the 6 states where routine vaccination is considered, and 1.4% in the remaining states.

NIIW activity, San Diego, California, 2004

NIS has also begun to collect children's entire provider-reported influenza-vaccination histories. Beginning in 2002, ACIP encouraged annual influenza vaccination, when feasible, for all children aged 6–23 months and their household contacts, and for out-of-home caregivers for children aged less than 2 years. With the 2004–2005 influenza season, ACIP recommends vaccination for these groups.

NIS data for 2003 indicate that only 7.4% of children aged 6–23 months during the influenza season received one or more influenza vaccinations in the 2002–03 influenza season (the first year of the ACIP encouragement), and only 4.4% of children in the age group were fully vaccinated against influenza. To be fully vaccinated, these children receive two doses if not previously vaccinated or one dose if previously vaccinated against influenza. Over all, substantial variability in influenza coverage was observed among states and selected urban reporting areas. The complete report is available at: www.cdc.gov/mmwr/preview/mmwrhtml/mm5337a1.htm.

The National Immunization Survey (NIS)/Data Comparison Study was completed in 2003. In 2004 NIP extended the NIS/Data Comparison Project to four grantees, Mississippi, North Dakota, South Dakota, and Wisconsin. The extended study:

- Assessed the feasibility of using the National Immunization Survey to monitor registry participation and consequently provide a more accurate measure of Healthy People 2010 progress
- Developed an algorithm to match each recorded registry dose to one and only one NIS dose, or to synchronize each registry dose with an NIS dose
- Categorized the demographics of children who participate in a registry, as well as those who do not participate
- Assessed the possibility of supplementing NIS data with registry data to provide more accurate immunization coverage estimates

Results of the study will be available late third quarter or fourth quarter 2005.

School and Childcare Vaccination Surveys

State laws require that children be immunized if they attend a childcare facility and when they enter school. Immunization records of children entering school are reviewed each fall. In addition, states conduct studies to validate reports from schools. Results from these studies are used to ensure high vaccination levels in the population of children enrolled in schools. Periodic assessments also are conducted in childcare facilities. A summary of the coverage results of children in schools, childcare centers, and Head Start programs and of state laws about vaccination is reported annually to the National Immunization Program (NIP), Centers for Disease Control and Prevention. The most recent survey results can be viewed on the CDC-NIP website at www.cdc.gov/nip/coverage/schoolsurv/overview.htm.

Improving Immunization Rates

Assessments of Progress

AFIX: Assessing Immunization Levels and Improving Immunization Rates at Provider Practices

Researchers at NIP led efforts to validate and promote a quality improvement strategy, AFIX (Assessment, Feedback, Incentives, Exchange), that is now recommended nationwide as a standard of practice. The AFIX strategy helps public and private immunization providers determine practice coverage levels and implement programs to improve immunization rates. AFIX uses assessment and feedback about immunization levels to move the practice toward a standard of excellence. NIP research demonstrated that this strategy, which originated in a Georgia immunization program, could be successfully applied nationwide. Healthy People 2010 includes the objective that 90% of all immunization providers receive annual assessment and feedback. NIP staff are currently researching the most cost-effective methods for conducting assessment and feedback at the more than 40,000 provider sites that use federally purchased vaccine.

AFIX and VFC

AFIX has been applied through the Vaccines for Children (VFC) program to improve immunization coverage levels among preschool children. During the last decade, the VFC program has enabled low income, underinsured, uninsured, and other eligible children to receive immunizations in a “medical home” (from a consistent provider at a single site) rather than being referred to the local health department for immunization. Because many VFC participants receive immunizations from private healthcare providers, CDC initiated the VFC-AFIX project to promote AFIX to private provider sites participating in the VFC program. The year 2004 marked the fourth full year that all eligible NIP grantees participated in this initiative. NIP also offers its grantees written guidelines for using AFIX and hands-on training to implement AFIX.

The Clinic Assessment Software Application (CASA)

The Clinic Assessment Software Application (CASA) is a menu-driven database for assessing immunization coverage in any healthcare setting where immunizations are delivered. CASA can provide diagnostic information about immunization administration practices. The application generates diagnostic reports that identify late starts and missed opportunities for simultaneous vaccine administration, and it can assist healthcare providers with reminder and recall notices for children who are due or overdue for immunizations. NIP also offers a version of the software for assessing adult immunization coverage (Adult Clinic Assessment Software Application, or ACASA). Because CASA and ACASA were developed by CDC, the software is public domain and can be installed and shared with others at no cost.

Improving Immunization among Disadvantaged Children

Researchers at NIP conducted a pioneer study of the effectiveness of a partnership between immunization providers and clinics that operate through the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) program. WIC serves 45% of infants nationwide and more than 5 million children under the age of 5 and is the single largest point of access to health services for low-income preschool children—who are at the highest risk for low vaccination coverage. A White House Executive Memorandum dated December 11, 2000 directed WIC clinics to assess the complete immunization status of their clients, a complex task given the nearly 2 dozen required doses of recommended vaccines. Because many clinics did not have the resources to carry out a complete assessment, NIP researchers developed and validated a simpler alternative, assessing coverage for a single vaccine—DTaP—as a proxy for assessing the complete vaccination record. This assessment method went into effect in late 2002 and has resulted in an increase in the number of WIC clinics nationwide that offer immunization assessment and referral as part of standard operating procedures.

Success Story

Improving Vaccine Management and Delivery

The National Immunization Program (NIP) distributes over 60 million doses of pediatric vaccine every year, almost 60% of the pediatric vaccine used in the United States. The bulk of this vaccine is distributed through the Vaccines for Children program (VFC). VFC has been a recognized success, consistently increasing provider enrollment, improving access for eligible children, and improving national immunization levels. However, many vaccine management and accountability processes are still conducted in ways established more than a decade ago.

Background of the Vaccine Management Business Improvement Project

In late 2003, NIP was challenged by the Department of Health and Human Services (HHS) and by the President's Management Agenda to improve its business practices. New requirements, such as implementing a national pediatric stockpile and eliminating non-compliant funding practices, compelled NIP to re-examine the operating model for vaccine programs. Due to the complexity of the existing vaccine supply system, HHS, the Centers for Disease Control and Prevention (CDC), and the Government Accountability Office (GAO) also requested an analysis of the current system. Most methods and processes used to manage vaccines are derived from models put into place with the inception of the VFC program 10 years ago, and some processes were first used as early as the 1960s. These processes include stand-alone computer applications, offline spreadsheets, and paper-based, manually updated records. No uniform process to manage and track supplies is available, and no electronic or automated system supports or oversees the distribution, supply, and availability of vaccines. Yet over the past decade, the number of children served and the number of doses of vaccine provided have increased dramatically. In addition, several vaccines have been added to the list of recommended childhood vaccines.
The processes that were adequate to manage and serve participants in 1994 are not sufficient for the public health needs of the 21st century. As a result of these requirements and concerns, the Vaccine Management Business Improvement Project (VMBIP) was initiated.

Goals

VMBIP is intended to simplify processes for ordering, distributing, and managing vaccines. The program will improve responses to public health crises related to disease outbreaks, vaccine shortages, and disruption of the vaccine supply. A more efficient vaccine supply system will, in turn, result in the redirection of public health resources from vaccine distribution to other critical public health activities which have improved immunization coverage. The project will also improve the accountability of the VFC program. Finally, the project will significantly reduce the lead time between orders for and delivery of vaccine and will enable the direct delivery of vaccines to providers.

First Steps

NIP gathered a team to analyze the systems for managing and distributing vaccines and recommend improvements to them. This team spent the early part of 2004 examining the entire vaccine supply chain, from manufacturers to providers. In addition to working with CDC headquarters staff in Atlanta, the team visited 10 state and local immunization projects, 4 vaccine manufacturers, and 2 vaccine distributors. The team studied many aspects of the VFC program, including funds management, vaccine distribution, provider ordering, inventory management, and the operation of the national pediatric stockpile.

Success Story

Continued

Vaccine Management Business Improvement Project

In April 2004, the VMBIP team presented its findings to CDC and NIP leadership. A much more consolidated approach to vaccine ordering and distribution was recommended. This bold new model departs from the current fragmented, decentralized approach and shows, at any time, where the product is in the supply chain—information essential to improving the nation's vaccine supply.

The VMBIP team is developing a detailed description of the components of a robust vaccine management program. The team has engaged over 70 staff from federal and state immunization programs and set up workgroups for all major aspects of the program, including Ordering and Distribution, Vaccine Stockpile, Systems, Fiscal Operations, Vaccine Management and Accountability, and Communications. The team is also identifying requirements for the new program model and drafting a request for proposals for distribution services.

Throughout this period of investigation, the team collaborated with many groups involved in vaccine programs, including leadership within NIP, CDC, HHS, and the National Vaccine Program Office (NVPO), partner organizations such as the Association of Immunization Managers (AIM), the Association of State and Territorial Health Officials (ASTHO), Every Child by Two (ECBT), the National Association of County and City Health Officials (NACCHO), the American Immunization Registry Association (AIRA), and immunization program managers. The team has been encouraged by the positive feedback and the constructive suggestions received thus far and will continue to work closely with all vaccine program stakeholders.

Next Steps

VMBIP plans a small-scale pilot of the revised process in 2005, involving a limited number of providers in a few grantee states. After the initial test of proposed systems and processes, the program will expand to include all providers in the grantee states. When the expanded pilot programs have been validated, the new system will be implemented through logical groups of states—perhaps beginning with those that already use commercial distributors, then moving to those states that now distribute vaccine through state-sponsored systems. The new model will be rolled out across the entire nation during 2006–2007.

Over the past decade, the number of children served and the number of doses of vaccine provided have increased dramatically. In addition, several vaccines have been added to the list of recommended childhood vaccines. The processes that were adequate to manage and serve participants in 1994 are not sufficient for the public health needs of the 21st century.